

**BEFORE THE  
PUBLIC SERVICE COMMISSION OF  
SOUTH CAROLINA**

**DOCKET NO. 2019-182-E**

In the Matter of: )  
)  
South Carolina Energy Freedom Act )  
(H.3659) Proceeding Initiated Pursuant )  
to S.C. Code Ann. Section 58-40-20(C): )  
Generic Docket to (1) Investigate and )  
Determine the Costs and Benefits of the )  
Current Net Energy Metering Program and )  
(2) Establish a Methodology for )  
Calculating the Value of the Energy )  
Produced by Customer-Generators )

**DIRECT TESTIMONY OF  
DR. JULIUS A. WRIGHT FOR DUKE  
ENERGY CAROLINAS, LLC AND  
DUKE ENERGY PROGRESS, LLC**

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**I. INTRODUCTION AND SUMMARY**

**Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

A. Dr. Julius (“Chip”) A. Wright, 18 Edgewater Drive, Cartersville, GA 30121.

**Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

A. I am the Managing Partner of J. A. Wright & Associates, LLC. In that role, I act as a consultant to regulated utilities and regulatory agencies and other public bodies on issues related to economics, economic modeling, regulatory policy, industry restructuring, demand-side investments, and resource planning.

**Q. ON WHOSE BEHALF ARE YOU SUBMITTING THIS TESTIMONY?**

A. I am submitting this testimony on behalf of Duke Energy Carolinas, LLC (“DEC”) and Duke Energy Progress, LLC (“DEP”) (DEC and DEP are herein referred to collectively as the “Companies”).

**Q. PLEASE DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.**

A. I received an undergraduate degree from Valdosta State College (BS Chemistry), an MBA in Finance from Georgia State University, and a Masters and Ph.D. in Economics from North Carolina State University, where I focused on regulatory and environmental economics. Among other past experiences, I served as a Commissioner on the North Carolina Utilities Commission from 1985 to 1993. Prior to that service as a North Carolina Utility Commissioner, I served three terms as a North Carolina State Senator and worked in process engineering for 12 years at three chemical plants, the last with Corning in Wilmington, NC.

1 Over the past two decades in my consulting practice, I have dealt  
2 extensively with electric and natural gas utilities focusing on a number of issues.  
3 In this context, I have testified before regulatory commissions and legislative  
4 bodies, presented studies and authored reports on issues related to electric and gas  
5 regulation, and I have been a guest speaker at the Bonbright Conference, other  
6 seminars, and at the Georgia Institute of Technology. I was recently a visiting  
7 Professor teaching both microeconomics and macroeconomics courses at the  
8 University of The Virgin Islands. I was also one of three economists engaged by  
9 the California State Auditor to examine the problems that led to that state's  
10 electric energy crisis in the summer and fall of 2000. I have worked for the last 30  
11 plus years in the field of electric and gas regulation, primarily in the Southeast. A  
12 copy of my resumé is attached as **Wright Direct Exhibit 1**.

13 **Q. HAVE YOU TESTIFIED BEFORE THE PUBLIC SERVICE**  
14 **COMMISSION OF SOUTH CAROLINA (THE "COMMISSION") IN ANY**  
15 **PRIOR PROCEEDINGS?**

16 A. Yes, I have appeared before the Commission a number of times on a variety of  
17 topics related to both the electric and gas industries for a number of years. For  
18 example, I testified before the Commission on performance-based rate making  
19 mechanisms in Docket No. 90-588-G, filed August 3, 1995; on gas cost  
20 adjustments for South Carolina Pipeline Corporation in Docket No. 1999-007-G,  
21 September, 1999; for several electric utilities on the issue of recovery of RTO  
22 (Gridsouth) related costs, Docket No. 2004-178-E, October, 2004; for South  
23 Carolina Electric and Gas related to IRP initiatives in Docket No. G-5, Sub 495,

1 March 2008; testimony for Duke Energy and others related to smart metering and  
2 energy efficiency rate setting procedures, Docket No. 2005-386-E, April, 2007; in  
3 testimony for Duke Energy and Progress Energy Carolinas related to the Energy  
4 Policy Act of 2005, Dockets No. 2005-385-E and No. 2005-386-E, April, 2007;  
5 and more recently in testimony for DEP related to coal ash in Docket No. 2018-  
6 318-E.

7 **Q. ARE YOU INCLUDING ANY EXHIBITS IN SUPPORT OF YOUR**  
8 **TESTIMONY?**

9 A. Yes. I am providing a copy of my resumé as **Wright Direct Exhibit 1** and a  
10 summary of net energy metering (“NEM”) valuation policies, reports, and  
11 proceedings utilized in other states as **Wright Direct Exhibit 2**.

12 **Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

13 A. The purpose of my testimony is to discuss the ways in which an economic  
14 analysis is performed when one seeks to determine the direct and indirect  
15 economic impact of a particular public policy or program. An analysis of direct  
16 and indirect economic benefits is included as a sub-part of the overall cost-benefit  
17 analysis required by S.C. Act No. 62 of 2019 (“Act 62”). Specifically, that  
18 analysis seeks to quantify the costs and benefits arising from the Companies’  
19 current NEM programs under S.C. Act No. 236 of 2014 (“Act 236”).

20 As I discuss in this testimony, I believe that economic impacts could also  
21 be a consideration in the adoption of the value of solar methodology at issue in  
22 this docket. However, as I caution in my testimony, it is difficult—at best—to  
23 identify and then precisely quantify all of the economic impacts, both positive and

1 negative, related to an NEM program. I also present a number of economic  
2 considerations that should guide any studies or evaluations related to the  
3 economic impacts of an NEM program, and I review how other states have  
4 considered the question of economic impacts related to NEM programs. I  
5 conclude this testimony with two recommendations. First, that the Commission  
6 keep in mind the various factors that must be considered in the appropriate  
7 quantification of the direct and indirect economic impacts from most policies or  
8 programs—particularly since no other utility commission has apparently  
9 quantitatively applied any estimated economic impacts of NEM to their state's  
10 NEM tariffs. Furthermore, as the Commission reviews any economic evaluations  
11 presented in this proceeding, I recommend that the Commission examine how  
12 these economic models have incorporated or addressed, if at all, the various issues  
13 I have raised.

14 **Q. HOW IS YOUR TESTIMONY ORGANIZED?**

15 A. The remainder of my testimony is organized as follows. Section II provides  
16 background information related to the evaluation of direct and indirect economic  
17 impacts in this docket, as well as information focusing upon how such evaluation  
18 has been carried out in other jurisdictions. Section III provides a definition of  
19 direct and indirect economic impacts that are the economic considerations  
20 required by Act 62. Section IV presents a discussion of how an economic impact  
21 analysis is conducted and presents a number of issues that need to be properly  
22 considered in undertaking such an analysis. Section V provides a review of how  
23 other states have considered economic impacts in considering NEM issues.

1 Finally, Section VI presents my recommendations regarding this Commission's  
 2 consideration of the economic impacts related to the Companies' current NEM  
 3 programs under Act 236 ("Act 236 NEM Programs").

## 4 **II. BACKGROUND**

### 5 **Q. WHAT IS THE BASIS FOR THIS COMMISSION TO INCLUDE THE** 6 **CONSIDERATION OF THE DIRECT AND INDIRECT ECONOMIC** 7 **IMPACTS IN ITS REVIEW OF THE ACT 236 NEM PROGRAMS?**

8 A. Act 62—called the South Carolina Energy Freedom Act—was signed into law by  
 9 South Carolina Gov. Henry McMaster in May 2019. As part of the Commission's  
 10 comprehensive review of NEM in this state, Act 62 directs the Commission to  
 11 "open a generic docket to (1) investigate and determine the costs and benefits of  
 12 the current net energy metering program; and (2) establish a methodology for  
 13 calculating the value of solar produced by customer-generators."<sup>1</sup> In evaluating  
 14 the costs and benefits of the current NEM program, the Commission is directed to  
 15 consider a number of factors including "[t]he direct and indirect economic impact  
 16 of the net energy metering program to the State."<sup>2</sup> As such, the Commission is  
 17 directed to consider the costs and benefits of the current NEM programs including  
 18 evaluating economic impact.

<sup>1</sup> S.C. Code Ann. § 58-40-20 (C)(1) and (C)(2).

<sup>2</sup> S.C. Code Ann. § 58-40-20 (D)(4).

1   **Q.    IS IT UNUSUAL FOR THE COMMISSION TO CONSIDER DIRECT AND**  
2       **INDIRECT ECONOMIC IMPACTS WHEN EVALUATING AN NEM**  
3       **PROGRAM?**

4    A.   Not necessarily, but it is my experience that the limited role economic impacts  
5       play in assessing NEM programs and corresponding rate structures occurs from a  
6       qualitative—not quantitative—perspective. For example, to my knowledge,  
7       economic impacts and related studies have only been used in a qualitative fashion  
8       when evaluating NEM programs. This is an important fact to remember as the  
9       Commission moves forward in its consideration of the direct and indirect  
10      economic costs and benefits related to the Act 236 NEM Programs.

11   **Q.    HAS THE ECONOMIC IMPACT OF NEM BEEN STUDIED IN OTHER**  
12      **STATES IN SIMILAR PROCEEDINGS?**

13   A.   Yes, my research indicates the issue has been studied and discussed in  
14      proceedings related to NEM programs and methodologies in other states.  
15      Usually, the proceedings in other states use the term “value of solar” to describe  
16      the valuation methodology. Sometimes these NEM proceedings in other states  
17      have adopted or employed a NEM (or value of solar) valuation methodology  
18      similar to the value of solar under Act 236. I will discuss several NEM valuation  
19      methodologies found in other states later on in this testimony.

20

1 **Q. DID YOU CONDUCT A STUDY TO DETERMINE THE DIRECT AND**  
 2 **INDIRECT ECONOMIC IMPACTS OF THE ACT 236 NEM**  
 3 **PROGRAMS?**

4 A. No. It is my understanding that at this time the Companies do not possess the  
 5 data particular to their service territories to conduct such an analysis. However,  
 6 the Companies are hopeful that the discovery process in this docket will yield  
 7 such information given that the rooftop solar industry participants likely collect  
 8 and maintain such information. Moreover, the Companies will evaluate any  
 9 studies conducted by participants or their experts in this docket to determine  
 10 whether any such information is contained therein.

11 **III. DEFINING DIRECT AND INDIRECT ECONOMIC IMPACTS**

12 **Q. WHAT ARE THE SPECIFIC ECONOMIC IMPACTS THAT THE**  
 13 **COMMISSION IS TO CONSIDER WHEN EVALUATING THE**  
 14 **ECONOMIC IMPACT OF ACT 236 NEM PROGRAMS?**

15 A. Act 62 requires the consideration of both direct and indirect economic impacts  
 16 when evaluating the costs and benefits of the Act 236 NEM Programs.<sup>3</sup>

17 **Q. PLEASE DEFINE WHAT IS MEANT BY DIRECT AND INDIRECT**  
 18 **ECONOMIC IMPACTS.**

19 A. Although Act 62 does not define these terms, the direct economic impacts from a  
 20 particular decision are the immediate results of the direct expenditures related to a  
 21 certain activity and represent the initial economic changes related to the industry  
 22 in question. Said another way, direct impacts describe the changes in economic

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<sup>3</sup> S.C. Code Ann. § 58-40-20(D)(4).

1 activity for the particular part of the economy, like construction, that first  
2 experiences a change because of a project, policy decision, or some other  
3 economic stimuli. For example, for a new facility like a residential solar  
4 installation the direct economic impact reflects the initial expenditure on the  
5 installation and purchase of the system, other building materials used such as  
6 wiring or connection to the grid, any fees or taxes related to the purchase and  
7 installation, and any employment related to the installation.

8 Indirect economic impacts typically represent the increase in economic  
9 output from the various industries whose output is impacted by the industry  
10 affected with the direct economic impact discussed in the preceding paragraph. In  
11 other words, the indirect economic impact from a new residential solar installation  
12 can be the changes in sales, income or jobs for businesses within the region that  
13 supply goods and services to the residential solar installers.

14 The combination of the direct and indirect economic impacts creates a  
15 ripple effect through a region's economy (called the multiplier effect). As a result  
16 of the direct and indirect effects on the economy, the level of production,  
17 employment, taxes, and household income throughout the economy increases, and  
18 depending on other factors can result in more net spending in the region being  
19 studied. In addition, the direct and indirect economic impact results in a third  
20 economic impact referred to as the induced economic impact.

1   **Q.    ALTHOUGH ACT 62 ONLY REQUIRED THE CONSIDERATION OF**  
2       **DIRECT AND INDIRECT ECONOMIC IMPACTS, WOULD THE**  
3       **CONSIDERATION OF THE INDUCED ECONOMIC IMPACTS**  
4       **INFLUENCE THE OVERALL ANALYSIS?**

5    A.   Including induced effects in an economic impact analysis would lead to either  
6       additional costs or benefits over an analysis that only included direct and indirect  
7       economic impacts.  Whether the inclusion of the induced economic impacts  
8       would be considered material is dependent upon the particular analysis.

9               **IV.    DEVELOPING AN APPROPRIATE ECONOMIC ANALYSIS**  
10              **RELATED TO THE IMPACTS OF NEM**

11  
12   **Q.    HOW WOULD AN ECONOMIC ANALYSIS TYPICALLY BE**  
13       **PERFORMED TO DETERMINE THE DIRECT AND INDIRECT**  
14       **ECONOMIC IMPACTS OF AN NEM PROGRAM?**

15   A.   To determine the economic impact of various policy decisions or proposed  
16       development projects from a quantitative perspective, economists typically  
17       employ a variety of modeling techniques in what is referred to as an economic  
18       impact analysis.  One primary technique often used in an economic impact  
19       analysis relies upon what are called input-output models.  These input-output  
20       models are based on the principle that new or reduced spending or employment  
21       by a firm will stimulate economic activity that can be quantified and forecast.  An  
22       econometric input-output model simply makes use of historical industry-specific  
23       data to develop mathematical relationships to estimate the changes in output,  
24       income and employment resulting from a specific type of activity, such as

1 construction of a new stadium. Two input-output models I have seen typically  
 2 employed in studies examining the economic impact of NEM programs include  
 3 the IMPLAN<sup>4</sup> and JEDI<sup>5</sup> models.

4 **Q. WHAT ARE SOME IMPORTANT CONSIDERATIONS WHEN**  
 5 **EVALUATING THE ECONOMIC IMPACTS OF THE ACT 236 NEM**  
 6 **PROGRAMS?**

7 A. There are a number of important considerations in developing an appropriate  
 8 economic impact analysis. These include:

- 9 • Properly characterizing the purpose of the economic study and reporting the  
 10 results with appropriate recognition of this purpose.
- 11 • Considering the economic consequences if a policy is not adopted, referred to  
 12 as the “but for” option.
- 13 • Ensuring an “apples to apples” comparison.
- 14 • Properly considering incentives and subsidies.
- 15 • Considering electric rate impacts.

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<sup>4</sup> IMPLAN is an Input-Output modeling system that uses annual, regional data to map these buy-sell relationships so users can predict how specific economic changes will impact a given regional economy or estimate the effect of past or existing economic activity. IMPLAN is a leading provider of economic impact data and analytical software. The company began in 1972 working with the US Forest Service and has grown to a current user base of academics, governments, economic developers, corporations, nonprofits, and consultants. See: <https://implanhelp.zendesk.com/hc/en-us/articles/360038285254-How-IMPLAN-Works>.

<sup>5</sup> The Jobs and Economic Development Impact (JEDI) models estimate the gross economic impacts of constructing and operating power generation, transmission, and biofuel plants at the state or national level. First developed by NREL’s researchers to model wind energy jobs and impacts, JEDI has been expanded to also estimate the economic impacts of biofuels and biopower, coal, conventional hydro, concentrating solar power, geothermal, marine and hydrokinetic power, natural gas, photovoltaics, and transmission lines. JEDI is based on project-specific and default inputs (derived from industry norms), JEDI estimates the number of jobs and economic impacts to a local area that could reasonably be supported by a power project. For example, JEDI estimates the number of in-state construction jobs from a new wind farm. JEDI models are input-output models designed to provide reasonable estimates, not exact numbers. JEDI also provides estimates on land lease and property tax revenues, when appropriate. See: <https://www.nrel.gov/docs/fy15osti/64129.pdf>.

- 1 • Properly accounting for the timing of the economic stimulus and related
- 2 impacts.
- 3 • Appropriately characterizing the presumed economic impacts.
- 4 • Utilizing an appropriate geographic region.
- 5 • Recognizing sound economic principles in the overall results.

6 It should be pointed out that each of the considerations listed above can raise  
7 several legitimate issues that become points of dispute among economic analysts.

8 **Q. PLEASE EXPLAIN WHAT YOU MEAN BY PROPERLY**  
9 **CHARACTERIZING THE PURPOSE OF THE ECONOMIC STUDY.**

10 A. To explain, one purpose of an economic study of rooftop solar might just be to  
11 consider if there are net economic benefits supporting such a program. In this  
12 case, there may be no comparison of the economic benefits of alternative energy  
13 solutions and limited consideration of other potential uses for the dollars spent on  
14 the rooftop solar. Another purpose of an economic study of rooftop solar might  
15 be to compare the economic benefits of rooftop solar to the option of utility-scale  
16 solar and this analysis and the related results serve a different objective than the  
17 first study. While each of these potential studies could provide important  
18 information to policy makers, it is important that the purpose of the study be clear  
19 as to what the results show and what they don't show.

20 **Q. PLEASE ELABORATE ON WHAT YOU CALLED THE "BUT FOR"**  
21 **OPTION.**

22 A. One of the more important considerations in an economic impact analysis is to  
23 simply ask the question where would the dollars be spent, or a particular

investment be made “*but for*” the investment being evaluated? In economic terms this is referred to as opportunity costs, and it relates to the idea that for most projects or investments, whether solar energy or the expenditure of tax dollars, the question to consider is where would those dollars or resources have been used and what economic activity has been foregone by virtue of the proposed net metered project? For example, any presumed jobs gained through solar development can result in jobs lost by displacing other generating resources or from electricity rate impacts. Therefore, an appropriate economic analysis would not only estimate the economic impact of the proposal itself, sometimes referred to as the gross economic impact, but it would also essentially subtract the foregone economic opportunity costs to yield what is sometimes called the net economic impacts.<sup>6</sup>

Finally, it must be pointed out that the input-output models used in the solar economic impact models I have reviewed, both IMPLAN or JEDI (which uses IMPLAN but is specific for renewable energy projects), report gross economic impacts, not net.<sup>7</sup> Therefore, using these models to construct an NEM economic analysis must incorporate the consideration of the “*but for*” alternative

<sup>6</sup> Pitt, D. et al, “*Analyzing the Costs and Benefits of Distributed Solar Generation in Virginia*,” pp. xiii, 43; New York State Energy Research and Development Authority, 2011, pp. xiii, 43, and *New York solar study*. [www.nysrerda.ny.gov/-/media/Files/Publications/Energy-Analysis/NY-Solar-Study-Report.pdf](http://www.nysrerda.ny.gov/-/media/Files/Publications/Energy-Analysis/NY-Solar-Study-Report.pdf). p. 5; and Alvarez, G. C., “*Study of the Effects on Employment of Public Aid to Renewable Energy Sources*,” 2009; and, James, T., et.al., “*The Economic Impact of Distributed Solar in the APS Service Territory, 2016-2035*,” Arizona State University, Feb. 16, 2016, p. ii; and Ashley Brown rebuttal testimony, New Hampshire Public Utilities Commission, Docket No. DE 16-576, Dec. 21, 2016, pp. 42-43; and “*Economic Impact Analysis of Clean Energy Development in North Carolina – 2019 Update*,” North Carolina Sustainable Energy Association, May 2019, p. 1-3; and Bess, R. and Ambargis, Z., “*Input-Output Models for Impact Analysis, Suggestions for Practitioners Using RIMS II Multipliers*,” US Bureau of Economic Analysis, presented at the 50<sup>th</sup> Southern Regional Science Association Conference, New Orleans, LA, March 23-27, 2011, p. 14.

<sup>7</sup> “*Limitations of JEDI Model*,” NREL at <https://www.nrel.gov/analysis/jedi/limitations.html>. U. S. Department of Energy presentation, p. 6 at [https://www.energy.gov/sites/prod/files/2014/01/f6/stat\\_webinar\\_082113\\_jedi.pdf](https://www.energy.gov/sites/prod/files/2014/01/f6/stat_webinar_082113_jedi.pdf).

1 expenditures which will result in a reduction in the gross economic benefits  
2 related to the NEM program.

3 **Q. PLEASE DISCUSS WHAT YOU MEAN BY STATING THE ECONOMIC**  
4 **ANALYSIS MUST ENSURE AN “APPLES TO APPLES” COMPARISON.**

5 A. If the point of the economic analysis is to present a solar energy option as a  
6 replacement for another electric energy resource, it is important to ensure that the  
7 economic study provides a proper comparison of the alternative energy resources.  
8 For example, if solar is the policy being considered, and the economic analysis  
9 assumes that this solar can replace other types of electric generator options, the  
10 economic analysis must ensure that the costs related to the solar energy option  
11 properly reflects the same levels of energy, demand, dispatchability, and  
12 reliability as the resources it is replacing.<sup>8</sup>

13 **Q. PLEASE DISCUSS FURTHER WHAT YOU MEAN BY STATING THAT**  
14 **INCENTIVES AND SUBSIDIES MUST BE PROPERLY CONSIDERED.**

15 A. An important economic consideration is that any incentive or subsidy be properly  
16 characterized in the economic analysis. For example, a tax incentive is a cost that  
17 represents a reduction in government spending elsewhere or there must be an  
18 increase in taxes. Either way, the incentive paid to support a particular program  
19 or policy represents the loss of government expenditures or taxpayer expenditures  
20 on other items, and that loss must be considered in the economic analysis.

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<sup>8</sup> For example, see “*Creating Jobs With ‘Green’ Power Sources*,” Huntington, H. G., Energy Modeling Forum, Stanford University, April 2009, pp. 12-13, and Perry, Mark J., “Inconvenient Energy Fact: It Takes 79 Solar Workers to Produce Same Amount of Electric Power As One Coal Worker,” American Enterprise Institute, May 3, 2017, See: <https://www.aei.org/carpe-diem/inconvenient-energy-fact-it-takes-79-solar-workers-to-produce-same-amount-of-electric-power-as-one-coal-worker/>, p. 2.

1    **Q.    PLEASE DISCUSS THE CONSIDERATION OF RATE IMPACTS.**

2    A.    It is important that the economic analysis somehow account for any impact on  
 3           electricity rates, otherwise the analysis will be incomplete. For example, if  
 4           adopting NEM increases electric rates as opposed to no adoption, then this fact  
 5           will depress economic activity all other things being equal, and vice versa.<sup>9</sup> The  
 6           reason is self-evident, because higher electric rates translate into higher costs for  
 7           most, if not all goods and services, this depresses the economic output and  
 8           purchasing power of most consumers over a wide region—and these higher  
 9           electric rates can continue for years thus depressing economic activity for years.  
 10          Unfortunately, the current input-output models assume constant prices so it will  
 11          be difficult to properly characterize and quantify the economic impact of higher  
 12          electric rates.<sup>10</sup>

13   **Q.    PLEASE DISCUSS WHY THE ECONOMIC ANALYSIS SHOULD**  
 14   **CONSIDER THE ISSUE OF TIMING.**

15   A.    The economic impact study must properly reflect the timing of the assumed  
 16          investments and related costs and benefits. For example, are the jobs being  
 17          produced by a proposed project for just one year or ongoing? Is the investment in  
 18          a construction project made in just one year or over several years, and does the

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<sup>9</sup> James, T., et. al., *“The Economic Impact of Distributed Solar In The APS Service Territory, 2016-2035,”* Final Report, Arizona State University, Feb. 16 2016, p. i., and Pitt, D. and Michaud, G., *“Analyzing the Costs and Benefits of Distributed Solar Generation in Virginia,”* Virginia Commonwealth University, p. 44.

<sup>10</sup> *“Scenario Solar PV Jobs and Economic Development Impact (JEDI) Model,”* Sunshot, US Dept of Energy, p.7, and McClaren, Joyce and Keyser, David, *“Deployment of Renewables to Support Regional Economic Development,”* NREL Solar Technical Assistance Working Group, meeting transcript, Fe. 24, 2015, p. 13 and Bess, R. and Ambargis, Z., *“Input-Output Models for Impact Analysis, Suggestions for Practitioners Using RIMS II Multipliers,”* US Bureau of Economic Analysis, presented at the 50<sup>th</sup> Southern Regional Science Association Conference, New Orleans, LA, March 23-27, 2011, p. 10.

investment lead to a final product, like an office building, that will have new jobs working in the finished office building starting 3 or four years out? An appropriate economic model obviously segregates jobs and investments based on this timing consideration (also note that usually construction jobs are short-term while ongoing O&M jobs are longer term).<sup>11</sup>

**Q. PLEASE DISCUSS WHAT YOU MEAN BY PROPERLY CHARACTERIZING THE ECONOMIC IMPACTS.**

A. This relates to the issue of whether the estimated economic impacts, such as jobs created, are new or simply redirected workers. To the extent that some of the new jobs are filled by workers who were previously employed then estimates of job creation can be overstated. Therefore, how to properly count jobs for a particular new program, such as construction workers, can be a debatable proposition. In addition, the investment made for certain projects, like solar rooftop panels, may be made for solar panels manufactured in another area or country. These types of dollar investments must be identified and excluded from the economic benefit. In economic terms these types of investment dollars that flow out from the region being studied are referred to as leakages.<sup>12</sup>

<sup>11</sup> James, T., et.al., *"The Economic Impact of Distributed Solar in the APS Service Territory, 2016-2035,"* Arizona State University, Feb. 16, 2016, p. ii; and Bess, R. and Ambargis, Z., *"Input-Output Models for Impact Analysis, Suggestions for Practitioners Using RIMS II Multipliers,"* US Bureau of Economic Analysis, presented at the 50<sup>th</sup> Southern Regional Science Association Conference, New Orleans, LA, March 23-27, 2011, p. 10, and *"Scenario Solar PV Jobs and Economic Development Impact (JEDI) Model,"* Sunshot, US Dept of Energy, p.12.

<sup>12</sup> Lesser, J. A., *"Renewable Energy and the Fallacy of "Green" Jobs,"* The Electricity Journal, Vol. 23, Issue 7, Aug./Sept. 2010, p. 49, and Bess, R. and Ambargis, Z., *"Input-Output Models for Impact Analysis, Suggestions for Practitioners Using RIMS II Multipliers,"* US Bureau of Economic Analysis, presented at the 50<sup>th</sup> Southern Regional Science Association Conference, New Orleans, LA, March 23-27, 2011, p. 10.

1   **Q.   PLEASE DISCUSS WHAT YOU MEAN REGARDING THE ANALYSIS**  
2       **USING AN APPROPRIATE GEOGRAPHIC REGION.**

3   A.   This issue is simply identifying the geographic region and then using the  
4       appropriate data, such as input-output model multipliers, for that region. Usually  
5       economic impact studies relate to a city or county and the input-output models'  
6       data apply to specific geographic areas.

7   **Q.   PLEASE DISCUSS WHAT YOU MEAN BY STATING THAT SOUND**  
8       **ECONOMIC PRINCIPLES SHOULD BE RECOGNIZED IN THE**  
9       **OVERALL RESULT.**

10  A.   Reflecting sound economic principles includes the issue of an “apples to apples”  
11       comparison discussed above, but it goes further. The economic analysis must  
12       properly characterize the results and any conclusions offered by the economic  
13       study. For example, one can legitimately argue that men using shovels to dig a  
14       new building’s foundation creates more construction jobs than men using a  
15       backhoe. Therefore, from a job perspective the economic impacts are more  
16       positive for using shovels than using a backhoe. However, this analysis  
17       completely ignores the productivity gains from using a backhoe, so the simplistic  
18       comparison of jobs created has not properly characterized the input and output  
19       productivity and costs and has thus violated the basic economic principles related  
20       to production efficiency. The adherence to basic economic efficiency arguments  
21       should at least be a part of the discussion, if not included in the analysis, in any  
22       complete economic impact analysis.

1 **Q. YOU MENTIONED THE USE OF THE JEDI AND IMPLAN INPUT-**  
 2 **OUTPUT MODELS. WHAT ARE SOME ISSUES TO CONSIDER WHEN**  
 3 **USING THESE MODELS IN AN ECONOMIC ANALYSIS RELATED TO**  
 4 **NEM?**

5 A. First, in using these models, all of the numerous economic impact considerations I  
 6 discussed above must be properly considered if possible, or at a minimum  
 7 discussed as model limitations in the analytical results. In addition, as I  
 8 mentioned earlier, the IMPLAN or JEDI models report gross economic impacts,  
 9 not net.<sup>13</sup> Therefore using these models for an NEM economic analysis should  
 10 incorporate an alternative investment analysis, possibly one that is a substitute  
 11 energy supply, either of which will be a reduction in benefits, from the gross  
 12 NEM alternative.

13 Also, as I mentioned these models assume constant prices. This price  
 14 assumption is wrong if electric rates rise as a result of NEM and these models will  
 15 not inherently reflect this negative economic impact.

#### 16 **V. A REVIEW OF STATE-SPECIFIC NEM VALUATION STUDIES**

17 **Q. HOW HAVE OTHER STATES ADDRESSED THE ISSUE OF NEM**  
 18 **VALUATION?**

19 A. I reviewed a number of states NEM valuation policies, reports, and proceedings.  
 20 A summary of each of these reviews is shown in **Wright Direct Exhibit 2**. This  
 21 review indicated the following: First, several states have examined the issue of

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<sup>13</sup> "Limitations of JEDI Model," NREL at <https://www.nrel.gov/analysis/jedi/limitations.html> and U. S. Department of Energy presentation, p. 6 at [https://www.energy.gov/sites/prod/files/2014/01/f6/stat\\_webinar\\_082113\\_jedi.pdf](https://www.energy.gov/sites/prod/files/2014/01/f6/stat_webinar_082113_jedi.pdf).

1 economic impacts related to NEM (or solar valuation)—and usually these  
 2 economic impacts specifically studied the economic impacts related to the  
 3 creation of jobs. Second, my review found no state has used economic impacts in  
 4 a quantitative fashion in terms of applying a dollar value that was added or  
 5 subtracted from the overall costs used in that state’s NEM program.

6 As for specific examples, my review indicated that the state of Florida has  
 7 specifically rejected the use of an NEM methodology like South Carolina’s.  
 8 Several other states (Georgia, Maine, Oregon and Austin, TX) do use an NEM  
 9 (or solar) valuation process similar to South Carolina’s but specifically excluded  
 10 economic benefits from their valuation of their NEM programs.

11 **Q. CAN YOU PROVIDE A SAMPLE OF THE STUDIES CONDUCTED BY**  
 12 **SOUTH CAROLINA’S NEIGHBORING STATES THAT RELATE TO**  
 13 **ECONOMIC IMPACTS OF NEM?**

14 A. Yes. Georgia and North Carolina have had proceedings related to this issue.  
 15 These are summarized below:

- 16 • A 2013 study<sup>14</sup> prepared for the North Carolina Sustainable Energy  
 17 Association concluded that new solar resources will provide economic  
 18 benefits for electric ratepayers in North Carolina. This study also claimed  
 19 that “Renewable DG results in more local job creation than fossil generation,  
 20 enhancing tax revenues.”<sup>15</sup> The source for this claim was a 2013 North

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<sup>14</sup> “*The Benefits and Costs of Solar Generation for Electric Ratepayers in North Carolina*,” Beach, R. T. and McGuire, P. G., Crossborder Energy, Oct. 18, 2013.

<sup>15</sup> IBID, p. 18.

1 Carolina RTI and La Capra study.<sup>16</sup> However, a rebuttal to this RTI/La  
 2 Capra study pointed out some flaws in the RTI/LA Capra study.<sup>17</sup> This 2013  
 3 La Capra study was updated by RTI International in subsequent years using  
 4 the same methodology with updated data.<sup>18</sup> It should be noted that  
 5 notwithstanding this study's claims, the North Carolina Utility Commission  
 6 did not include in a quantitative fashion the economic benefits or costs of  
 7 renewable energy in that state's avoided costs or net metering tariffs at that  
 8 time.

- 9 • In 2017, Georgia Power<sup>19</sup> adopted a value of solar valuation methodology  
 10 that incorporated the same basic cost/benefit components found in South  
 11 Carolina's NEM valuation, except that the Georgia valuation did not include  
 12 the consideration of economic (or jobs) related benefits or costs.

<sup>16</sup> A 2013 study by RTI International and La Capra Associates (could not be located on the internet at the citations noted) found that North Carolina's clean energy and energy efficiency programs contributed \$1.7 billion to the state's economy from 2007-2012, created or retained 21,163 job-years over this period, and will provide long-term ratepayer benefits for the state. The study is reported to be available (but not available at this time) at <http://energync.org/assets/files/RTI%20Study%202013.pdf>.

<sup>17</sup> "Peer Review of the Economic Utility Portfolio, and Rate Impact of Clean Energy Development In North Carolina," Tuerck, D. G., et. al., April, 2013 at: <https://www.johnlocke.org/acrobat/spotlights/RTIPeerReview20130401A.pdf>, p. 4.

<sup>18</sup> *Economic Impact Analysis of Clean Energy Development in North Carolina – 2016 Update*, Prepared for the North Carolina Sustainable Energy Association by RTI International, April, 2016, June 2017, May, 2019.

<sup>19</sup> See Order in Docket No. 40161, Dec. 22, 2016 and Georgia Power Company's filing regarding a framework for determining the value of renewable generation filed in this docket and dated May 12, 2017, pp. 3-4.

1 **VI. RECOMMENDATION**

2 **Q. WHAT DO YOU RECOMMEND AS AN APPROPRIATE WAY FOR THIS**  
3 **COMMISSION TO CONSIDER THE DIRECT AND INDIRECT**  
4 **ECONOMIC IMPACTS OF THE ACT 236 NEM PROGRAMS?**

5 A. I would simply recommend that the Commission keep in mind the various factors  
6 that must be considered in the appropriate quantification of the direct and indirect  
7 economic impacts from most policies or programs. I believe it is important for  
8 this Commission to consider that no other utility commission has apparently  
9 quantitatively applied any estimated economic impacts of NEM to their state's  
10 NEM tariffs. Furthermore, as the Commission reviews any economic evaluations  
11 presented in this proceeding, I recommend that the Commission examine how  
12 these economic models have incorporated or addressed, if at all, the various issues  
13 I have raised.

14 **Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY AT THIS TIME?**

15 A. Yes, at this time.

Julius A. “Chip” Wright is the President of

J. A. Wright and Associates, LLC  
18 Edgewater Drive  
Cartersville, GA 30121  
770-365-1872  
[jawright@mindspring.com](mailto:jawright@mindspring.com).

### Experience Overview

Prior to starting his firm, Dr. Wright was a Client Partner for AT&T Solutions Utilities and Energy Practice and before that a Principal in EDS’ Management Consulting Services. Dr. Wright has been consulting electric gas, and telephone utilities on regulation, economics, rates, production modeling and strategic planning for the past three years. Prior to this Dr. Wright served an eight-year term as a Utility Commissioner for the state of North Carolina. Prior to that he served three terms in the North Carolina State Senate while he was a senior project engineer for Corning Glass Works on their optical wave guide project in Wilmington, North Carolina. He has a total of 14 years’ government-related experience, 12 years’ plant-related engineering experience, and he has established two companies.

Dr. Wright (in 2011) has also been a Visiting Professor at the University of the Virgin Islands teaching sophomore courses in both Macro and Micro Economics.

While serving on the North Carolina Utility Commission, he served four years on the National Association of Regulatory Utility Commissioners (NARUC) Electricity Committee. He

has served in various other advisory capacities, including the Keystone

Committee on Externalities; the North Carolina Radiation Protection Committee, and on an Oversight Committee for a joint North Carolina/New York/ Department of Energy (DOE) project.

Dr. Wright has also served on the Southern States Energy Board Task Force on Restructuring the Electric Utility Industry.

### Regulatory Policy Issues, Prudence Reviews and Regulatory Studies

- Presented testimony and rebuttal testimony to the North Carolina Utility Commission in support of Duke Energy Carolinas’ efforts to recovery coal ash remediation costs the Company incurred in response to new coal ash disposal costs, Feb., 2017, Docket No. E-7, Sub 1146.
- Presented testimony and rebuttal testimony to the North Carolina Utility Commission in support of Duke Energy Progress’ efforts to recovery coal ash remediation costs the Company incurred in response to new coal ash disposal costs, June and November, 2017, Docket No. E-2, Sub 1146.
- Provided testimony and rebuttal testimony on behalf of Duke Energy Carolinas in North Carolina related to the appropriate regulatory policy with respect to the recovery of coal ash remediation costs. Docket No. E-7, Sub 1146, August 25, 2017.

**WRIGHT DIRECT EXHIBIT 1**

Page 2

- Provided testimony and rebuttal testimony on behalf of Duke Energy Progress in North Carolina related to the appropriate regulatory policy with respect to the recovery of coal ash remediation costs. Docket No. E-2, Sub 1142, June 1, 2017.
- Provided Testimony on behalf of Dominion Energy North Carolina related to the appropriate regulatory policy related to the Commission's rule regarding the use of the Company's nuclear capacity factor compared to national averages as a way to determine the prudence of nuclear operations in a fuel cost recovery proceeding, Docket No. E-22, Sub 546, October 2017.
- Prudence review: report for Georgia Power Company regarding the prudence of Plant Vogtle new nuclear construction costs, *"The South Carolina Public Service Commission's Prudence Reviews of Summer Units 2 and 3 as Persuasive Precedent for the Georgia Public Service Commission's Regulatory Treatment of Vogtle Units 3 and 4,"* April 5, 2016, Georgia Public Service Commission, Docket No 29849.
- Regulatory study: *"The Economic and Rate Implications from an Electric Utility's Loss of Large Load Customers,"* presented in rebuttal testimony for Progress Energy Carolinas, North Carolina Utility Commission Docket No. E-2, Sub 1023, March 4, 2013.
- Regulatory study: Dr. Wright routinely provides testimony support and witness training to several Fortune 500 investor-owned utilities in the Southeast, most recently involving two rate cases (2011, 2012) and three rate related cases dealing with an ongoing nuclear construction project (2008, 2010, 2012).
- Prudence review: related to a review of affiliate cost structure relative to compliance with FERC Order 707, conducted for a major SE utility, 4th quarter, 2008.
- Prudence review: related to a review of Affiliate Cost for Service Company Charges to a Regulated Utility, study conducted for SCANA Corporation, May, 2008.
- Regulatory study: review of Electric Utility Formula Rate Plans and specific Entergy formula rate plans, conducted for Entergy Mississippi, Jan-May, 2008.
- Prudence review: June 2005, provided a financial analysis related to the options for collecting and saving nuclear plant decommissioning costs for Duke Energy and this study along with a presentation was provided to the North Carolina Public Utility Commission and Staff.

**WRIGHT DIRECT EXHIBIT 1**

Page 3

- Regulatory study: provided analysis for Entergy Mississippi that was presented to the Mississippi Public Service Commission related to the valuation of services that Company provided to an unregulated affiliate, November 2002.
- Prudence review: “*Energy Deregulation*,” March 2001, report of the California State Auditor on the causes of the problems related to high electric prices and blackouts (from May, 2000 through June 2001, and ongoing) in California’s restructured electric marketplace. Dr. Wright was one of three consultants who essentially researched and prepared the State Auditor’s report.
- Prudence review: Principal author with Dr. Al Danielsen of “*Reliability of Electric Supply In Georgia*,” published by The Bonbright Utilities Center, University of Georgia, June, 2001.
- Regulatory study: Presented testimony before the North Carolina Public Utilities Commission on behalf of SCANA Corporation regarding issues related to market power in its merger with Public Service Company of North Carolina, Docket No. G-5, Sub 400; G-3, Sub 0.
- Prudence review: was the principal author of a report and investigation titled “*An Analysis of Commonwealth Edison’s Planning Process For Achieving Reliability of Supply*,” which was an investigation of the Company’s planning process to meet its statutory obligation for supplying electricity as Illinois transitions to a competitive retail electric market, Illinois Commerce Commission Docket No. 98-0514.
- Regulatory study: co-authored a national study that used computer modeling techniques to quantify the impact of electric competition on the aggregate economy in each of the 48 continental United States.
- Regulatory study: presented testimony to Louisiana Legislative Committee on behalf of Entergy Corporation regarding the various regulatory and technical issues that need to be addressed in the transition to competition.
- Regulatory study: presented testimony For Virginia Power with regard to its transition to competition plan.
- Regulatory study: testified before the Mississippi Public Service Commission on issues related to the establishment of retail electric competition, including ISO establishment, regional power exchanges, legislation, taxes and regulatory policies.
- Regulatory study: presented testimony for Entergy Corp. in

**WRIGHT DIRECT EXHIBIT 1**

Page 4

- both Louisiana and Arkansas in support of its transition to competition filing.
- Regulatory study: worked with three major southeastern utilities on developing business and regulatory strategy as they prepare for competition.
  - Regulatory study: filed a report with the South Carolina Legislature that studied the impact of electric competition on the state of South Carolina.
  - Was a panelist on a Southern Gas Association national televised forum on performance based regulation for the natural gas industry.
  - Regulatory study: Was the lead policy witness for South Carolina Electric and Gas on obtaining regulatory approval to transfer depreciation reserve from a nuclear plant to T&D depreciation reserve. This is a critical issue in preparing for competition and limiting stranded investment.
  - Developed regulatory and marketing strategy for Entergy with regard to its telecommunications initiatives. In these efforts he worked with the EDS Telecommunications Consulting Group.
  - Prudence review: was the lead analysis of the prudence of Central Vermont Public Service Company's power and resource acquisitions over a five year period. The prudence of this utility's power supply strategy was under investigation in a rate case proceeding. Dr. Wright's team filed testimony supporting the Company and their efforts were instrumental in undermining the charges of imprudence brought by the Company's opposition.
  - Regulatory study: developed an EDS intra-company task force to address the issues related to FERC's Transmission NOPR. This task force subsequently filed three responses to FERC's Open Access NOPR which provide a basis for EDS to maintain a leadership position as the electric utility industry undergoes restructuring to a competitive market.
  - Regulatory study: helped develop a regulatory strategy and presented testimony on behalf of South Carolina Pipeline. In this case, an economic analysis prepared by Dr. Wright and Dr. Frank Cronin (from EDS Economic Planning and Analysis Consulting Group) was presented along with recommendations. The analysis and recommendations were generally accepted by the Commission staff.
  - Prudence reviews: as a North Carolina Utility Commissioner Dr. Wright was involved in the prudence reviews of the costs related to the construction of three nuclear plants, Catawba 1 & 2 and Shearon Harris. In

addition, he was involved in several other prudence reviews of various utilities.

### ***Resource Planning & Economic Analysis***

As a Commissioner he has been involved in a variety of resource planning issues including chairing the last North Carolina Resource Planning hearing that involved Duke Power Company, Carolina Power and Light, Virginia Power Company and the North Carolina Electric Membership Corporation.

He was also selected by the states of North Carolina and New York and the Department of Energy to be one of five representatives on a peer review panel overseeing a Resource Planning project being conducted by the Oak Ridge National Laboratories. In addition to these initiatives Dr. Wright has:

- *“The Economic and Rate Implications from an Electric Utility’s Loss of Large Load Customers,”* presented in rebuttal testimony for Progress Energy Carolinas, North Carolina Utility Commission Docket No. E-2, Sub 1023, March 4, 2013.
- Provided an analysis of electric vehicle economics and the legislative, engineering, and regulatory issues that regulated electric utilities should address in both residential and commercial installments of electric vehicle charging stations. Studied performed for Fortune 500 Southeastern investor-owned utilities, 2011-2012.
- Provided a study to a Fortune 500 large Southeastern investor-owned utility related to the use of regulated electric rates designed to help retain current large industrial customers, 2012.
- Provided a Fortune 500 large Southeastern based investor-owned electric utility an economic, engineering, and environmental evaluation of a proposed renewable fuel alternative including the provision of an assessment and the design for a large-scale pilot test in one of that utility’s fossil-fired facilities, 2012.
- Provided testimony for Entergy Mississippi related to whether the Mississippi Public Service Commission should adopt some proposed Federal standards related to integrated resource planning and energy efficiency, Docket No. 2008-AD-477, February 2009.
- Provided a report to Entergy Mississippi on fuel cost recovery mechanisms that included a nationwide survey of fuel adjustment mechanisms, 2008.
- Provided testimony in North Carolina for Duke Energy related to whether the North Carolina Public Utility Commission should approve the recovery of nuclear generation project development costs, Docket No. E-7-Sub 819, April 2008.
- Provided a review for Duke Energy of the cost assumptions

**WRIGHT DIRECT EXHIBIT 1**

Page 6

and regulatory initiatives related to new nuclear plant construction nationwide, April 2008.

- Provided analysis for Entergy Mississippi related to new nuclear plant applications and any new regulatory mechanisms adopted by various states related to the approval or cost recovery associated with these new nuclear plants, April 2008.
- Presented testimony on behalf of Entergy Mississippi on its IRP or electric resource plan and demand side initiatives, June, 2008, Docket No. 2008-AD-158.
- Provided testimony in Georgia for Georgia Power Company supporting that Company's Integrated Resource Planning process, the appropriate methods for evaluating demand side energy options, and supporting that Company's planned demand side programs, Docket No. 24505-U, June 2007.
- Provided testimony in North Carolina for Duke Energy and Progress Energy related to the regulatory and economic rationale and appropriateness for using the "peaker" methodology and other methodologies for the establishment of avoided cost rates, Docket No. E-100-Sub 106, June 2007.
- Provided analysis for Entergy Mississippi that was presented to the Mississippi Public Service Commission related to the valuation of services that

Company provided to an unregulated affiliate, November 2002.

- Was the lead policy witness for South Carolina Electric and Gas on obtaining regulatory approval to transfer depreciation reserve from a nuclear plant to T&D depreciation reserve. This is a critical issue in preparing for competition and limiting stranded investment.
- Was instrumental in acquiring a large engagement for a major southeastern utility examining their competitive position as it relates to a competitive electric market. During the engagement he provided input and guidance on regulatory issues related to the deregulation of the electric industry.
- Assisted Carolina Power and Light Company in their integrated resource planning process by advising and facilitating a Commission directed public policy panel.
- Developed an overview of Niagara Mohawk Gas' integrated resource planning efforts. This engagement was under a contract from Oak Ridge National Laboratories.

***Renewable Fuels, Demand Side, Energy Efficiency***

- Provided an analysis of electric vehicle economics and the legislative, engineering, and regulatory issues that regulated electric utilities should address in

**WRIGHT DIRECT EXHIBIT 1**

Page 7

- both residential and commercial installments of electric vehicle charging stations. Studied performed for Fortune 500 Southeastern investor-owned utilities, 2011-2012.
- Provided a Fortune 500 large Southeastern based investor-owned electric utility an economic, engineering, and environmental evaluation of a proposed renewable fuel alternative including the provision of an assessment and the design for a large-scale pilot test in one of that utility's fossil-fired facilities, 2012.
  - Provided testimony for Entergy Mississippi related to that Company's proposed new demand side initiatives Docket No. EC-123-0082-00, February 2009.
  - Provided testimony for Entergy Mississippi related to whether the Mississippi Public Service Commission should adopt some proposed Federal standards related to integrated resource planning and energy efficiency, Docket No. 2008-AD-477, February 2009.
  - Presented testimony on behalf of Public Service of North Carolina supporting that Company's proposed demand side initiatives as well as the cost recovery of those initiatives, Docket No. G-5, Sub 495, March 2008.
  - Provided testimony in South Carolina for Duke Energy, South Carolina Electric and Gas, and Progress Energy related to whether the South Carolina Public Service Commission should adopt some proposed Federal standards related to smart metering and energy efficiency rate setting procedures, Docket No. 2005-386-E, April, 2007.
  - Provided testimony in South Carolina for South Carolina Electric and Gas related to Integrated Resource Planning and that Company's demand side initiatives, June 2007.
  - Provided testimony in Georgia for Georgia Power Company supporting that Company's Integrated Resource Planning process, the appropriate methods for evaluating demand side energy options, and supporting that Company's planned demand side programs, Docket No. 24505-U, June 2007.
  - Provided testimony in North Carolina for Duke Energy and Progress Energy related to whether the North Carolina Public Utility Commission should adopt some proposed Federal standards related to smart metering, energy efficiency, and electric resource planning, Docket No. E-100-Sub 108, November 2006.
- Nuclear Issues***
- Provided Testimony on behalf of Dominion Energy North Carolina related to the appropriate regulatory policy related to the

**WRIGHT DIRECT EXHIBIT 1**

Page 8

- Commission's rule regarding the use of the Company's nuclear capacity factor compared to national averages as a way to determine the prudence of nuclear operations in a fuel cost recovery proceeding, Docket No. E-22, Sub 546, October 2017.
- Prudence review: report for Georgia Power Company regarding the prudence of Plant Vogtle new nuclear construction costs, *"The South Carolina Public Service Commission's Prudence Reviews of Summer Units 2 and 3 as Persuasive Precedent for the Georgia Public Service Commission's Regulatory Treatment of Vogtle Units 3 and 4,"* April 5, 2016, Georgia Public Service Commission, Docket No 29849.
  - Dr. Wright provided testimony support and witness training involving three rate related cases dealing with an ongoing nuclear construction project (2008, 2010, 2012).
  - Provided testimony in North Carolina for Duke Energy related to whether the North Carolina Public Utility Commission should approve the recovery of nuclear generation project development costs, Docket No. E-7-Sub 819, April 2008.
  - August 2008 provided a study to Duke Energy Carolinas examining the issue of cost justification for new nuclear power facilities.
  - June, 2005, provided a financial analysis related to the options for collecting and saving nuclear plant decommissioning costs for Duke Energy and this study along with a presentation was provided to the North Carolina Public Utility Commission and Staff.
- Cost of Service, Rate Design, Forecasting***
- While serving more than eight years on the North Carolina Commission, Dr. Wright was involved in several cost of service and rate design analyses, testimonies, and orders. This included work in electric, telephone, gas, and water utilities. Additionally, he has presented testimony on performance based ratemaking and he has been involved in analyzing electric utility forecasting models, including end-use models, regression analysis (both linear and nonlinear) and customer discrete choice modeling forecasts. Furthermore, Dr. Wright's Ph.D. is in environmental and regulatory economics with special research into nonlinear minimal cost optimization procedures for electric utility production models. This work included optimizing investments, optimal regulatory regimes, pricing, cost recovery, and rate of return issues.
- In addition, he has:
- *"The Economic and Rate Implications from An Electric Utility's Loss of Large Load Customers,"* presented in rebuttal testimony for Progress Energy Carolinas, North Carolina Utility Commission Docket No. E-2, Sub 1023, March 4, 2013.

**WRIGHT DIRECT EXHIBIT 1**

Page 9

- Provided a study to a Fortune 500 large Southeastern investor-owned utility related to the use of regulated electric rates designed to help retain current large industrial customers, 2012.
- Presented testimony on behalf of Public Service of North Carolina related to the establishment of a formulary type rate setting mechanism for this natural gas LDC, August 2008, Docket No. G-5, Sub 495.
- Provided testimony in Georgia for Georgia Power Company supporting that Company's methodology for pricing fuel and its use of marginal replacement fuel cost procedures in its intra-company resource sharing arrangement with the Southern company, Docket No. 191142-U, April 2005.
- Provided an economic analysis of the proper regulatory regime for South Carolina Pipeline Company. In this analysis he presented testimony supporting performance based ratemaking and his recommendations were generally accepted by the Commission staff.
- Developed forecasted rates for two New York state utilities. These rates were developed to support a bond filing by a co-generator.
- Provided a forecast of power payments from New York State Electric and Gas (NYSEG) to two independent power

producers (IPPs). This forecast was used to estimate the level of overpayments by NYSEG to these IPPs, under PURPA regulations, which he used in a filing before FERC supporting the company's claim of unlawful overpayments.

***Telecommunications***

As a Commissioner he has regulated all types of telecommunications providers for eight years. In addition, he has worked with two electric utilities in strategy formulation in regard to their entering the telecommunications business. Furthermore, he has eight years' experience as a fiber optic engineer.

***Other Areas of Expertise***

Prior to joining EDS, he worked for eight years as a senior process engineer for Corning Glass in the design and production of optical waveguides (or fiber optics). Prior to that he worked for four years in the chemical industry as a process chemist and later as a senior project engineer. He has done work in environmental monitoring, process and product improvement, plant utilization, as well as starting and selling two successful companies – one in the financial leasing business and the other in the entertainment industry.

***Presentations and Publications***

Report for Georgia Power Company regarding the prudence of Plant Vogtle new nuclear construction costs, "*The South Carolina Public Service Commission's Prudence Reviews of Summer Units 2 and 3 as Persuasive Precedent for the Georgia Public*

*Service Commission's Regulatory Treatment of Vogtle Units 3 and 4,"* April 5, 2016, Georgia Public Service Commission, Docket No 29849.

*"The Economic and Rate Implications from AN Electric Utility's Loss of Large Load Customers,"* presented in rebuttal testimony for Progress Energy Carolinas, North Carolina Utility Commission Docket No. E-2, Sub 1023, March 4, 2013.

*"Energy Deregulation,"* March 2001, report of the California State Auditor on the causes of the problems related to high electric prices and blackouts (from May, 2000 through June 2001, and ongoing) in California's restructured electric marketplace. Dr. Wright was one of three consultants who essentially researched and prepared the State Auditor's report.

*"Low Cost States and Electric Restructuring - The Issue is the Price!"* presented to the 1999 Miller Forum on Government, Business and the Economy, University of Southern California, April 19, 1999.

*An Analysis of Commonwealth Edison's Planning Process For Achieving Reliability of Supply,* Illinois Commerce Commission Docket No. 98-0514.

*The Impact of Competition on the Price of Electricity,* author, published by L. A. Wright and Associates, November, 1998.

*"Retail Competition in the Electric Industry: The Impact on Prices,"* presented at the 18<sup>th</sup> Annual Bonbright Center Energy Conference, Atlanta, Georgia, Sept. 10, 1998.

*Potential Economic Impacts of Restructuring the Electric Utility Industry,* co-author, published by the Small Business Survival Committee, Washington, DC, November, 1997.

*"How Deregulation Will Affect Power Quality and Energy Management,"* presented at the Power Quality and Energy Management Conference co-sponsored by Entergy and EPRI, New Orleans, LA, Nov. 14, 1997.

*"Deregulation of the Electric Industry," Proceedings: National Business Energy Forum,* June 26, 1997, New Orleans, LA.

*"A Different View of the Market,"* presented at the Southeastern Electric Exchange Conference, June 25, 1997, Charlotte, N.C.

*"Restructuring The Electric Utility Industry: Theory vs. Reality,"* presented at the American Bar Association Restructuring Conference, Raleigh, NC, Dec. 5, 1996.

*"Restructuring: The Best Approach for Virginia,"* presented at the Virginia State Corporation Commission Electricity Restructuring Forum, Charlottesville, VA, Nov. 15, 1996.

*"Alternative Rate Making for the Natural Gas Industry: State Issues,"* presented at the Tenth Annual NARUC Biennial Regulatory Information Conference, Columbus, Ohio, Sept. 12, 1996.

*"RetailCo: To Regulate or Not?"* presented at the 9<sup>th</sup> Annual Automatic Meter Reading Symposium, New Orleans, La., Sept. 10, 1996.

“Convergence: The Competitive Revolution Comes To Electric Power,” presented to the Southeastern Association of Regulatory Commissioners Annual Convention, Point clear, Alabama, June 4, 1996.

“Stranded Assets Recovery Issues,” presented at the Western Electric Power Institute: Financial Forum, Tucson, Arizona, March 8, 1996.

“The Deregulation of the Electric Utility Industry : Current Status,” presented at the North Carolina Economic Developers Association Midwinter Conference, Pinehurst, N.C., February 23, 1996.

“Performance Based Regulation for The Natural Gas Industry,” panelist on Southern Gas Association’s Televised Regulatory Forum, Dallas, Texas, Jan. 18, 1996.

“Industry Structure Should Meet Stakeholder Objectives,” *Electric Light and Power*, Jan., 1996.

“Quantifying the Value of Stranded Investment: A Dynamic Modeling Approach,” *Proceedings: Implementing Transmission Access and Power Transactions Conference*, Denver, Colorado, Dec. 14, 1995.

“Quantifying the Value of Stranded Investment: A Dynamic Modeling Approach,” at the 15<sup>th</sup> Annual Bonbright Center Electric and Natural Gas Conference, October 9-11, 1995, Atlanta, Georgia.

Comments to FERC in the matter of Notice of Proposed Rulemaking on Open Access, Docket No. 95-9-000, 1995.

“The Road to Competition for Re-Regulated Industries,” presented at the 1995 PROMOD users Forum, St. Petersburg, Florida, May 1, 1995.

“*Comparing New York State Electric and Gas Corporation’s Non-Utility Generator Payments to Current Avoided Cost Rates*,” report submitted in support of affidavit filed before FERC in Docket No. EL 95-28-000.

“A Solution To The Transmission Pricing and Stranded Investment Problems” *Public Utilities Fortnightly*, January 1995.

“Electric Utility Competition: The Winning Focus,” presented at 1994 Southeastern Electric and Natural Gas Conference, Atlanta, Georgia, October 1994.

“*Gas Integrated Resource Planning: The Niagara Mohawk Experience*,” for Martin Marietta Energy Systems, Inc., under contract to the United States Department of Energy, ORNL/SUB/93-03369.

“Future Regulation In the Water Industry - Can We Solve the Problems Before They Happen?” *Water*, Vol. 29, No. 2, pp. 14-17, Summer 1988.

“The Regulatory Process - Historical and Today,” presented at Carolina Power and Light Company’s IRP Public Participation Committee Seminar, June 1994.

“The Regulatory Role In DSM: Who Pays?” presented at Carolina Power and Light Company’s IRP Public Participation Committee Seminar, June 1994.

**WRIGHT DIRECT EXHIBIT 1**

Page 12

“The Regulatory Process In North Carolina,” North Carolina Telephone Association, June 1991.

***Testimony***

- Provided testimony and rebuttal testimony on behalf of Duke Energy Carolinas in North Carolina related to the appropriate regulatory policy with respect to the recovery of coal ash remediation costs. Docket No. E-7, Sub 1146, August 25, 2017.
  - Provided testimony and rebuttal testimony on behalf of Duke Energy Progress in North Carolina related to the appropriate regulatory policy with respect to the recovery of coal ash remediation costs. Docket No. E-2, Sub 1142, June 1, 2017.
  - Provided Testimony on behalf of Dominion Energy North Carolina related to the appropriate regulatory policy related to the Commission’s rule regarding the use of the Company’s nuclear capacity factor compared to national averages as a way to determine the prudence of nuclear operations in a fuel cost recovery proceeding, Docket No. E-22, Sub 546, October 2017.
  - Presented testimony before the Mississippi Public Service Commission on behalf of Entergy Mississippi, Inc., in support of that company’s revisions to its Formula Ratemaking procedures,
- Docket No. 2014-UN-132, June 2014.
  - Rebuttal testimony for Progress Energy Carolinas, related to the economic and rate implications from an electric utility’s loss of large load customers, North Carolina Utility Commission Docket No. E-2, Sub 1023, March 4, 2013.
  - Provided a study to a Fortune 500 large Southeastern investor-owned utility related to the use of regulated electric rates designed to help retain current large industrial customers, and developed proposed testimony in support of this issue, 2012.
  - Provided an affidavit in support of Progress Energy Carolinas to the North Carolina Utility Commission in a proceeding considering the appropriate avoided cost rates that should be paid to an independent power producer, Sept., 2010, Docket No. E-2, Sub 966.
  - Presented testimony on behalf of Entergy Mississippi in an investigation of the Commissions procedures concerning confidentiality, August, 2010, Docket No. 2010-AD-259.
  - Presented testimony before the Mississippi Public Service Commission on behalf of Entergy Mississippi, Inc., in support of the formula rate plan annual evaluation, Docket No. 2002-UN-526, March, 2009.

**WRIGHT DIRECT EXHIBIT 1**

Page 13

- Presented testimony before the Mississippi Public Service Commission on behalf of Entergy Mississippi, Inc., in support of an energy efficiency pilot program and cost recovery mechanism, Docket No. 2009-UN-064, February, 2009.
- Presented testimony before the Mississippi Public Service Commission on behalf of Entergy Mississippi, Inc., in a proceeding to review statewide energy generation needs, Docket 2008-AD-270, August 2008.
- Presented testimony on behalf of Public Service of North Carolina related to the establishment of a formulary type rate setting mechanism for this natural gas LDC, August, 2008, Docket No. G-5, Sub 495.
- Presented testimony on behalf of Entergy Mississippi in an investigation of that utility's fuel charges and its fuel cost recovery, July, 2008, Docket No. 2008-AD-270.
- Presented testimony on behalf of Entergy Mississippi on its IRP or electric resource plan and demand side initiatives, June, 2008, Docket No. 2008-Ad-158.
- Presented testimony for Duke Energy in North Carolina related to the approval to incur pre-construction costs for the proposed Lee Nuclear Station, Docket No. E-7, Sub 819, May, 2008.
- Presented testimony for Duke Energy in South Carolina related to the approval to incur pre-construction costs for the proposed Lee Nuclear Station, Docket No. 2007 -440-E, June, 2008.
- Presented rebuttal testimony for Duke Energy in North Carolina related to the recovery of costs incurred by Duke related to GridSouth and why these expenses should be fully recoverable at this time, Docket No. E-7, Sub 828, October, 2007.
- Provided testimony for Georgia Power in its 2007 Integrated Resource Plan reviewing the plan filed by the Company and discussing how its demand-side proposals were reasonable, compared the Company's demand-side proposals to those found in neighboring states, and discussed the application of the various tests used to evaluate demand-side programs (TRC, RIM, PTC), Docket number 24505-U, May, 2007.
- Presented two testimonies before the South Carolina Public Service Commission on behalf of South Carolina Electric and Gas, Duke Energy and Progress Energy Carolinas in the investigation of adoption of energy efficiency and generation standards related to the Energy Policy Act of 2005, Dockets No. 2005-385-E and No. 2005-386-E, April, 2007.

**WRIGHT DIRECT EXHIBIT 1**

Page 14

- Presented testimony before the North Carolina Public Utilities Commission on behalf of Duke Energy and Progress Energy Carolinas in the investigation of adoption of energy efficiency and generation standards related to the Energy Policy Act of 2005, Docket No. E-100, Sub 108 November 2006.
- Presented testimony before the North Carolina Public Utilities Commission on behalf of Duke Energy in the investigation of Duke Energy's 2006 Integrated Resource Plan, Docket No. E-100, Sub 103, June, 2006.
- Provided testimony for Georgia Power in its 2005 Fuel Adjustment Hearing on the issue of the appropriate pricing methodology for the dispatch and sale of electricity in the Southern Company system, Docket number 19142-U, April, 2005.
- Presented testimony on behalf of South Carolina Electric and Gas Company before the South Carolina Public Utility Commission for South Carolina Pipeline Company related to the inclusion of a generating plant in rate base and to the recovery of RTO (Gridsouth) related costs, Docket No. 2004-178-E, October, 2004.
- Presented testimony on behalf of Entergy Mississippi before the Mississippi civil court dealing with maintaining the confidentiality of special use contracts, August, 2004.
- Presented rebuttal testimony before the South Carolina Public Utility Commission for South Carolina Pipeline Company related to the reasons for continuing a program that allows flexible, competitive based pricing for large, interruptible customers that have alternative fuels, Docket No. 2004-6-G, May 29, 2004.
- Presented testimony before the Georgia Public Service Commission on the appropriate range for a return on equity earnings band (a form of performance based regulation) to set in a Savannah Electric & Power Company rate case, Docket No. 14618-U, April, 2002.
- Presented testimony before the Georgia Public Service Commission on behalf of Scana Energy Marketing related to affiliate relationships and the appropriate affiliate rules between Atlanta Gas Light Company's regulated and unregulated affiliates. Docket No. 146060-U, August 24, 2001.
- Presented testimony before the Georgia Public Service Commission on the appropriate range for a return on equity earnings band (a form of performance based regulation) to set in a Georgia Power Company rate case, Docket No. 14000-U, November 19, 2001.
- Presented testimony before the North Carolina Public Utilities

**WRIGHT DIRECT EXHIBIT 1**

Page 15

- Commission on behalf of SCANA Corporation regarding issues related to market power the appropriate affiliate relationship protections necessary in its merger with Public Service Company of North Carolina, Docket No. G-5, Sub 400; G-3, Sub 0.
- Presented testimony before the South Carolina Public Service Commission on behalf of South Carolina Pipeline Corporation regarding issues related to its annual review of gas costs as reflected in its purchase gas adjustment charge, Docket No. 1999-007-G, September, 1999.
  - Presented testimony before the Arkansas Public Service Commission on behalf of Entergy Arkansas, Inc. regarding regulatory policies related to the definition of public utilities as it impacts citing requirements of non-utility owned generating facilities, Dockets No. 98-337-U, March 9, 1999.
  - Presented Rebuttal and Surrebuttal testimony before the Louisiana Public Service Commission on behalf of Entergy Louisiana, Inc. and Entergy Gulf States regarding regulatory policies related to stranded cost recovery and on the issue of whether investors have been compensated for the risk of not recovering stranded costs, Dockets Nos. U-22092SC and U-20925, September, 1998.
  - Presented testimony to the South Carolina Public Utility Commission for South Carolina Pipeline Corp. related to acquisition adjustments and regulatory policies related to performance based regulation, Docket No. 90-588-G, June, 1998.
  - Testified before the Mississippi Public Service Commission on issues related to the establishment of retail electric competition, including ISO establishment, regional power exchanges, legislation, taxes and regulatory policies, April 16, 17, 1997.
  - Support of Transition Proposals filed by Virginia Power Corporation, March, 1997.
  - Entergy Arkansas testimony in support of Transition to Competition Filing, 1997.
  - Entergy Louisiana testimony in support of Transition to Competition Filing, 1997.
  - Support of Performance Based Regulation for GTE South Inc., Docket No. P-19, Sub 277, before the North Carolina Utility Commission, filed Nov. 22, 1995.
  - Stranded Cost Regulatory Policy and Recovery Testimony before the South Carolina Public Service Commission, the Commission approved the request Dr. Wright was

**WRIGHT DIRECT EXHIBIT 1**

Page 16

advocating, Docket No. 95-1000-E, October 27, 1995.

- Performance based rate making mechanism and rate levels, testimony on behalf of South Carolina Pipeline Corporation, Docket No. 90-588-G, filed August 3, 1995.
- Prudence Review of Power Resource Planning for Central Vermont Public Service Company, Docket No. 5724, September 7, 1994.
- Rebuttal testimony on behalf of Central Vermont Public Service Company, Docket 5724, September 7, 1994.
- Surrebuttal testimony on behalf of Central Vermont Public Service Company, Docket No. 5724, September 9, 1994.

In addition, he has completed the Michigan State University Regulatory Course, several other NARUC courses on regulation, been an instructor on regulatory issues at several NARUC courses, completed management courses at Corning Glass and financial seminars at Bank Boston and Merrill Lynch dealing with regulation.

Dr. Wright (in 2011) has also been a Visiting Professor at the University of the Virgin Islands teaching sophomore courses in both Macro and Micro Economics.

***Education***

Dr. Wright received a Ph.D. in Economics from North Carolina State University, focusing on regulatory and environmental economics, and is a member of the honor society.

He received an MBA in finance from Georgia State University in 1978, graduating with honors.

He received a Master of Economics from North Carolina State University in 1991 and was a member of the honor society.

He received a B.S. in Chemistry from Valdosta State College in Valdosta, Georgia, graduating Magna Cum Laud.

- **NEVADA**

- A 2004 study<sup>20</sup> for Nevada by the National Renewable Energy Laboratory (“NREL”) estimated the economic impact in terms of employment and other economic factors from developing three different scenarios of larger solar generation projects (100 MW or greater) as potential options to satisfy that state’s proposed renewable portfolio standard. Direct and indirect employment and related economic impacts arising from the solar construction and operations were estimated.<sup>21</sup> What was not presented in the study was a comparison to solar generation of the economic benefits (and new jobs) from other types of electric generation resources.
- A 2016 Order<sup>22</sup> resulting from an NEM tariff investigation in Nevada discussed the issue of rooftop solar industry jobs. From the discussion in that Order, it is clear that solar proponents had argued that changes in the NEM tariff “*would result in the loss of nearly 6000 jobs.*”<sup>23</sup> That Order indicated that this estimated number of solar jobs was based on evidence from the Solar Foundation (a source used to buttress the claim of 3000 solar jobs in South Carolina) and stated regarding that evidence that “*the information and testimony presented by the Staff regarding the employment figures for Nevada’s solar industry indicates that the figures cannot be reasonably relied upon as an estimate of the number of solar*

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<sup>20</sup> “*The Potential Economic Impact of Constructing and Operating Solar Power Generation Facilities in Nevada,*” Schwer, R. K. and Riddel, M., National Renewable Energy Laboratory (“NREL”) February 2004.

<sup>21</sup> Economic estimates provided using the REMI economic forecast model from Regional Economic Models, Inc.

<sup>22</sup> Modified Final Order, Nevada Public Utilities Commission, Docket No. 15-07041, Feb. 12, 2016.

<sup>23</sup> IBID, p. 89.

*jobs in Nevada or the number of jobs that could potentially be impacted by this Order.*”<sup>24</sup>

- **AUSTIN, TX** - A 2006 study<sup>25</sup> prepared for the city of Austin, TX to determine the value of the economic development benefits of solar.<sup>26</sup> By and large the economic benefits used the same factors found in South Carolina’s methodology for valuing a net metered distributed energy resource, except that Austin included a value related to disaster recovery. This Austin study also briefly referenced job creation as an economic benefit to industry in general and to state, local, and federal governments, but it did not perform or provide any quantitative analysis of this benefit.<sup>27</sup>
- **PORTLAND, OR** - A 2007 study<sup>28</sup> for Portland, Oregon by ECONorthwest and NREL that estimated the economic (using the IMPLAN i/o model) impacts from using solar to “displace generation from traditional sources.”<sup>29</sup> This study does discuss and differentiate the gross versus the net economic benefits<sup>30</sup> estimated with the adoption of solar over other generation resources—in the studies case this was natural gas fired resources. Oregon actually began considering how to incorporate a value of solar methodology in 2012<sup>31</sup> and continued this investigation with an order in 2015.<sup>32</sup> This 2015 Order specifically rejected the consideration of economic

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<sup>24</sup> IBID, pp. 88-89.

<sup>25</sup> “*The Value of Distributed Photovoltaics to Austin Energy and the City of Austin*,” Hoff, T. E., et. al., Clean Power Research, LLC., March 17, 2006.

<sup>26</sup> IBID, p. ES-1.

<sup>27</sup> IBID p. 11.

<sup>28</sup> “*Energy, Economic, and Environmental Benefits of the Solar Initiative*,” Grover, S., ECONorthwest with the NREL, August, 2007.

<sup>29</sup> IBID, p. 2.

<sup>30</sup> IBID.

<sup>31</sup> See: “*In the Matter of an Investigation into the Appropriate Calculation of Resource Value for Solar PV Systems*,” Docket No. UM 1559, Order No 12-396 at 4-5 (Oct 18, 2012), directing the utilities to report the resource value of solar using their avoided cost methodologies, and IRP modeling methodology, with an adjustment for line loss savings.

<sup>32</sup> See Order in Docket No. UM-1716, Sept. 28, 2015.

impacts related to job creation in the determination of the value of solar in Oregon.<sup>33</sup>

In a 2016 proceeding in Oregon testimony was presented to the Oregon Public Utility Commission that did discuss the economic benefits related to job creation in the determination of the value of solar.<sup>34</sup> In 2019, the Oregon Public Utility Commission Order reiterated that while other economic valuations, such as future potential carbon regulation could be included in an update value of solar methodology that any presumed economic benefits related to job impacts from solar resources would still be excluded from consideration.<sup>35</sup> This same finding, excluding the consideration of economic impacts related to solar jobs, was repeated in a later 2019 Order.<sup>36</sup>

- **ARIZONA**

- A 2009 study<sup>37</sup> prepared for Arizona Public Service indicated that the winning business case for solar in Arizona “also includes softer, qualitative benefits such as increased job opportunities for installer”<sup>38</sup> This statement is notable in that it indicates that the jobs-based solar economic argument is based on what Arizona terms softer, qualitative based arguments. I would also note that in this Arizona study the claimed economic benefits from solar job creation was made absent any economic analysis comparing the solar case to alternative generation resources.
- A 2016 docket before the Arizona Corporate Commission (Docket No. E-00000J-14-0023) had testimony from the Alliance for Solar Choice presented by Mr.

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<sup>33</sup> Order in Docket No. UM 1716, Sept 28, 2015 p. 2.

<sup>34</sup> Testimony of Dolezel and Olson, Docket No. UM-1716, June 1, 2016.

<sup>35</sup> See Oregon Public Utility Commission Order in Docket No. UM-1910, Jan. 22, 2019, p. 2.

<sup>36</sup> Order in Docket No. UM 1910, Ja. 27, 2019, p. 2.

<sup>37</sup> “*Distributed Renewable Energy Operating Impacts and Valuation Study*,” R. W. Beck, January, 2009, p. 6-22.

<sup>38</sup> IBID, p. 6-28.

Thomas Beach<sup>39</sup> and a related supporting report prepared by Crossborder Energy. That report indicated that *“Distributed generation has higher costs per kW than central station renewable or gas-fired generation. However, a portion of the higher costs - principally for installation labor, permitting, permit fees, and customer acquisition (marketing) - are spent in the local economy, and thus provide a local economic benefit in close proximity to where the DG is located. These local costs are an appreciable portion of the “soft” costs of DG. Central station power plants have significantly lower soft costs, per kW installed, and often are not located in the local area where the power is consumed.”*<sup>40</sup> Consequently, this pro-solar report is claiming an economic benefit because of higher local costs – yet no mention is made of the opportunity costs lost by virtue of paying these higher local costs and no mention is made of the negative economic impact of higher electric rates.

- **CALIFORNIA** - A 2013 study<sup>41</sup> performed by E3 for the California Public Utilities Commission evaluated the costs and benefits of that state’s NEM program. This study did not consider or quantify any economic expansion or new jobs related economic benefits from the NEM program or any related solar generation facilities.
- **MONTANA** - A 2014 study<sup>42</sup> prepared for the Montana Environmental Information Center employed a combination of the IMPLAN and JEDI i/o models to investigate the economic impacts of various renewable energy and energy efficiency

<sup>39</sup> Arizona Corporate Commission, Docket No. E-00000J-14-0023, testimony from Thomas Beach for the Alliance for Solar Choice, Feb 25, 2016.

<sup>40</sup> IBID, testimony Exhibit 2, p. 20.

<sup>41</sup> “Introduction to the California Net Metering Ratepayer Impacts Evaluation,” Energy and Environmental Economics, Inc. (“E3”), Oct. 28, 2013.

<sup>42</sup> “Employment Effects of Clean Energy Investments in Montana,” prepared Synapse Energy Economics, Inc., June 5, 2014.

alternatives. The report concluded that *“Investment in wind, solar, and EE will create new jobs in Montana....[and] that small and large-scale solar PV have the largest impact of the energy resources procured.”*<sup>43</sup> This study did not include any economic analysis comparing solar generation to alternative non-renewable generation resources.

- **MINNESOTA** - A 2014 study<sup>44</sup> prepared for the Minnesota Department of Commerce developed a value of solar methodology that was very similar to the methodology proposed in this state’s value of NEM resources. This Minnesota proposal specifically noted that its value of solar methodology did not include economic benefits associated with solar jobs.<sup>45</sup>
- **MISSISSIPPI** - A 2015 study<sup>46</sup> prepared for the Public Service Commission of Mississippi referred to the 2014 Montana study (discussed above) as support for the proposition that solar development with NEM could be an “emergent industry”<sup>47</sup> in Mississippi. It also noted solar-related job creation as a potential economic benefit,<sup>48</sup> although the referenced Montana study did not include any economic analysis comparing solar generation to alternative non-renewable generation resources. The NEM order in this Mississippi proceeding did reference the potential for solar NEM to lead to increased economic benefits and job growth,<sup>49</sup> albeit no economic analysis

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<sup>43</sup> IBID, p. 20.

<sup>44</sup> “*Minnesota Value of Solar: Methodology*,” prepared by Clean Power Research for the Minnesota Dept. of Commerce and the Division of Energy Resources, April 14, 2014.

<sup>45</sup> IBID, Table 2, p. 5.

<sup>46</sup> “*Net metering in Mississippi*,” prepared by Synapse Energy Economics for the Public Service Commission of Mississippi, Sept. 19 2014.

<sup>47</sup> IBID p. 35.

<sup>48</sup> IBID p. 47.

<sup>49</sup> Order in Docket No. 2011-AD-2, Dec. 12, 2015, pp. 4, 22.

was presented nor was any presumed economic benefit quantified and used to develop NEM rates.

- **MAINE** - A 2015 study<sup>50</sup> in Maine developed a proposed methodology for valuation of solar distributed energy. The methodology proposed largely mirrored South Carolina's NEM methodology in terms of the factors considered. However, the Maine methodology did not include any consideration of economic benefits related to jobs although it did discuss the fact that solar industry incentives can be "designed to stimulate job creation and foster state economic growth."<sup>51</sup> There was no discussion of whether or how to quantify or apply these job creation economic benefits to the value of solar or to the related NEM tariffs.

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<sup>50</sup> "Maine Distributed Solar Valuation Study," Maine Public Utilities Commission, April 14, 2015.

<sup>51</sup> IBID p. 8.